

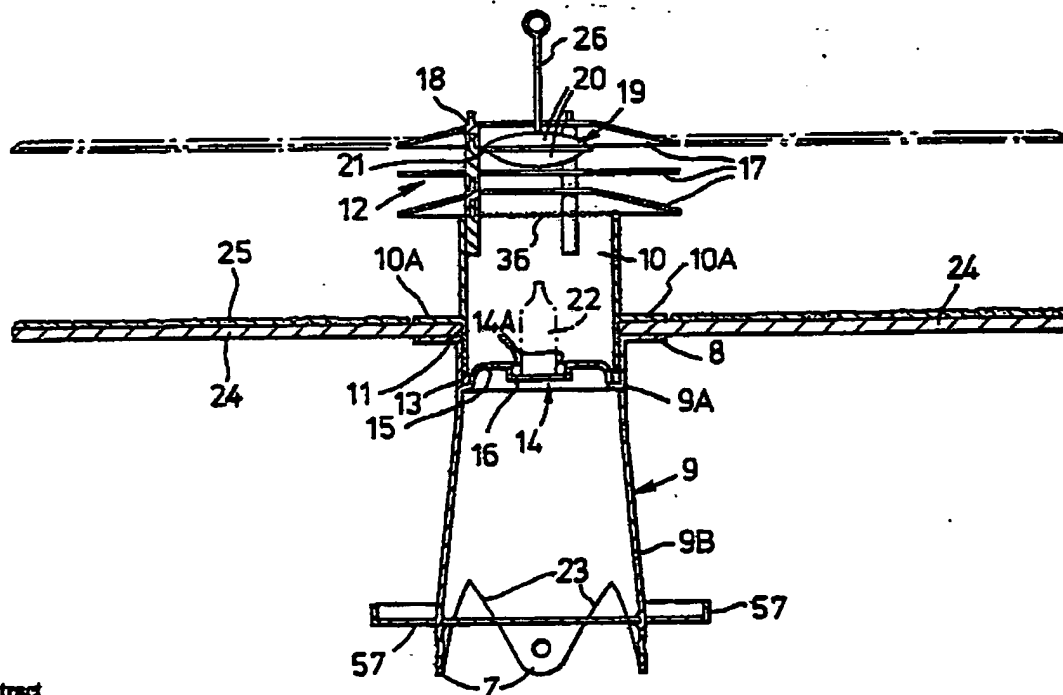
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(54) Title: GAS OR VAPOUR DISPERSING APPARATUS



(57) Abstract

Apparatus for dispersing a gaseous or vapourised pheromone trail into the atmosphere under determined conditions comprises first container (10) in which a pheromone source (22) is located. Means (12) to create an upward draught is provided surmounting the first container (10). Flying insects lured by the trail enter the means (12) and into the first container (10) thence to a second container (9) out of which they cannot escape. Alternatively, the insects land on a sticky insecticide from which they cannot escape.

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GAS OR VAPOUR DISPERSING APPARATUS

This invention relates to apparatus for dispersing a gas or vapour into the atmosphere under determined conditions.

Certain hormones, called pheromones, have been developed as an attractant for various flying insects, or insects which pass through a flying stage. There are also other attractants available either of similar scent to the pheromones, or of similar scent to a popular food source for particular species of flying insects. It is proposed to lure these flying insects by laying airborne trails of these pheromones or attractants, and to entrap and subsequently kill any flying insects so attracted. Hereinafter in the specification and claims the word "pheromone" is used to include also any other attractant available for the purposes stated, and also to include natural pheromones released by actual insects held in captivity.

The object of the present invention is to provide an apparatus for dispersing an airborne trail of a gaseous or vapoured pheromone into the atmosphere.

According to the present invention, there is provided an apparatus for dispersing a gaseous or vapourised pheromone into the atmosphere, comprising a container in which are provided means to hold at least one source from which gaseous or vapourised pheromone is released, the container having at its top an outlet over which means to create an upward draught is mounted, and means being provided through which air can be drawn into the container.

Preferably, the means to create an upward draught comprises a series of annular vanes arranged in a pre-determined spaced relationship the uppermost and lowermost of which are parallel and of frusto-conical shape or substantially of frusto-conical shape, central



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apertures in said vanes, a common axis about which the vanes are centred and arranged in predetermined vertical spaced relationship, a plurality of supports parallel to and radial of said axis, the lower two of said vanes
5 converging towards their centres to form a venturi at their inner peripheries, a device of aerodynamic shape mounted co-axially with the vanes and located between the upper two vanes, the device being circular in plan and masking the central apertures in the vanes,
10 and having upper and lower cone-like or dish-shaped air-deflecting walls arranged base to base about said common axis, the upper wall of the device being parallel or substantially parallel to the uppermost and lowermost vanes.

15 Preferably also, the container is an upright tube, the opening of the lower periphery of which is closable by a web provided in a second container the means in the container through which air can be drawn being one or more air bleed holes provided in said web which
20 closes off the opening at the lower periphery of the first container. Each pheromone source holding means is provided on the top of the web to extend into the first container. A skirt extends peripherally around the container below the means and on top of which skirt
25 a sticky insecticide is located to entrap and kill insects.

Preferably further, the second container one or more cut-outs are provided.

Alternatively, the second container is open-
30 topped closable by a lid centrally of which is provided the outlet over which the first container and means to create an upward draught is mounted, a tubular portion having the web thereacross being provided for engagement with said first container and to hold said lid to
35 said first container. The second container is of inverted



truncated conical shape over the lower periphery of which a collecting bag is securable.

Embodiments of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which:-

Fig. 1 is a vertical cross-sectional view of a first embodiment of an apparatus according to the present invention for dispersing a gaseous or vapourised pheromone into the atmosphere;

Fig. 2 is a side elevational view of the apparatus shown in Fig. 1 with a skirt removed for clarity;

Fig. 3 is a vertical cross-sectional view of a second embodiment of an apparatus according to the present invention for dispersing a gaseous or vapourised pheromone into the atmosphere;

Fig. 4 is a plan view of a second container of the apparatus shown in Fig. 1; and

Fig. 5 is a plan view of the apparatus of both embodiments of the invention having an annular canopy secured to an uppermost vane of the apparatus.

Referring to the drawings, a first embodiment of an apparatus for dispersing a gaseous or vapourised pheromone into the atmosphere comprises a first container in the form of an upright tube 10 over the upper periphery and outlet 11 of which means 12 to create an upward draught is mounted. The lower periphery 13 of the tube 10 is closed by a web 14 provided in a second container 9 engageable with said first container, the web 14 closing off the opening at the lower periphery. Air inlet means for the tube 10 is provided as circular series of air bleed holes 15 radially of the web 14. Pheromone source holding means is provided in the form of a recess 16 centrally of the web 14, radial fingers 14A extending inwardly of said recess 16 to support



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a source therein. The bleed holes 15 are provided about the recess 16. The tube 10 has a peripheral lip 10A extending outwardly adjacent to the bottom of the lower periphery and the outer side of the tube 10 between said lip 10A and the lower periphery is screw-threaded. The second container 9 has a minor upper tubular portion 9A integral with a major lower hollow frusto-conical portion 9B. The web 14 extends across the second container 9 adjacent to the lower end of tubular portion 9A. The inner face of the tubular portion 9A has an internal screw thread for engagement with the thread of the first container 10. A lip 8 extends peripherally from around the top of the tubular portion 9A and extends to be in circumferential alignment with lip 10A.

The means 12 to create an upward draught comprises a vertically-spaced series of three annular vanes 17 centred on a common vertical axis. The vanes 17 are carried by a plurality of supports 18, such as three as shown, equi-spaced around the inner peripheries of the vanes 17. The longitudinal axes of the supports 18 are parallel to the common vertical axis of the vanes 17. The uppermost and lowermost vanes 17 are parallel and of frusto-conical shape, the angle to the horizontal being, of example between 10° and 15° and the intermediate vane 17 is normal to the common vertical axis. The supports 18 are mounted co-axially with said vanes 17 and between the top two adjacent vanes 17 a device 19 is provided secured to said supports 18 for masking the central apertures in said vanes 17. This device 19 is of aerodynamic shape created by joining upper and lower cone-like, air-deflecting walls 20 arranged base to base about said common axis. Each wall 20 has a peripheral skirt 21, the skirt 21 extending into the space between the top and intermediate vanes 17. The upper wall 20 is parallel or substantially parallel to the



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uppermost and lowermost vanes 17. The bottom and intermediate vanes 17 are arranged to form a venturi at their inner peripheries due to the convergence of said vanes 17 as hereinbefore described whereby acceleration of airflow is created. Above the venturi is an expansion chamber which occupies the space between the uppermost and adjacent vane 17. The device 19 is mounted at a predetermined vertical relationship in the expansion chamber. The device 19, using acceleration of airflow, reduces the negative pressure within the means to smooth airflow therethrough. The means 12 are secured to the container at the bottom of the supports 18. The pheromone sources are collars 22 impregnated with pheromone and which are fitted one at a time into the recess 16, the impregnation of pheromone of the collars 22 being in such a way that gaseous or vapourised pheromone is given off from the collars 22 at a determined slow rate. The gaseous or vapourised pheromone is carried in a flow of air induced into the first container 10 through holes 15 by suction created by air from the atmosphere passing through the means 12 and creating an upward draught. The air carrying the gaseous or vapourised pheromone passes out of the outlet 11 and through the spaces between the top of the tube 10 and bottom vane 17 and between the bottom and intermediate vanes 17 and is carried as a airborne trail away from the apparatus. To prevent air flow passing the bottom of the second container 9 and creating a suction to prevent airflow through holes 15, the bottom of the lower periphery of the second container 9 is provided with a series of inverted V-cuts 23. A bottom plate 51 is fitted internally of and extending peripherally from said second container 9 to define air entries at the top of the V-cuts 23, the bottom plate 57 serving to protect the air entries. These inverted V-cuts 23



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create air turbulence thereby preventing suction. A skirt 24 extends peripherally around the tube 10 held between lip 10A and lip 8 and is to support a tray 25 of sticky insecticide to entrap and kill
5 flying insects. The remaining parts of the lower periphery of the second container 9 between the V-cuts 24 can be used as feet 7 whereby the apparatus is self-supporting on a table-top. Alternatively,
10 the apparatus can be hung or suspended from a support either uprightly or invertedly by use of a hanger 26 having an eye at the upper end thereof or by use of cords threaded through eyes provided in the bottom of the feet 7 respectively.

Before use, collar 22 located in recess 16 and
15 a tray 25 is located on the skirt 24. In use, the apparatus is suspended uprightly by hanger 26 invertedly by cords through eyes in feet 7 from a tree or other support, or rests self-supportedly on a table-top. Gaseous or vapourised pheromone is
20 released from the source and is carried by the air induced through holes 15 as hereinbefore described and issues from the apparatus as an airborne trail. The type of pheromone chosen is to attract a
25 particular flying insect and these insects fly along the trail to get to the source. They land on the tray 25 and are entrapped in the insecticide. The shape of the vanes 17 and the device 19 prevent down-
draughts, wind to create downdraughts being deflected by said vanes 17 and converted into laminar airflow
30 through the means 12. Due to the venturi, airflow into the means between the bottom and intermediate vanes 17 is first compressed and accelerated. This causes a reduction in pressure of the air above the outlet 11 creating an updraught. Airflow between the
35 top and intermediate vanes 17 enters the expansion chamber causing a fall in air pressure and this is increased by the airflow passing over the bottom



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aerofoil 20, thereby reducing further air pressures at the outlet. The outlet areas of the means available for exhaustion of air from the outlet are such that the sum total thereof is equal to or
 5 greater than the area of the outlet. This is calculated by a mathematical formula, as follows:-

$$\frac{\pi r^2}{2} \cdot \frac{\pi d^2}{4} \cdot \frac{1}{tw}$$

- 10 where X is the radius of the outlet, d is the diameter of the aperture in the centre of the vanes, and tw is the total height available for exhaustion of air and this comprises
1. The distance between the circumference of the
 15 outlet and the closest point to it of the underside of the bottom vane. Plus
 2. The sums of the distance between the bottom and intermediate vanes measured at the circumference of the central aperture in the vanes. Plus
 - 20 3. The distance between the circumference of the central aperture of the intermediate vane and the nearest point on the outer edge or circumference of the skirt of the device. The collar 22 is replaced as required. To prevent debris carried in the
 25 atmosphere from landing on the tray 25 and making the insecticide ineffective, an annular canopy 50 is provided to be secured to the uppermost vane 17 as shown.

In a second embodiment as shown in Fig. 3, in
 30 which like parts will be denoted by like numerals, the second container 30 is open-topped, and is closable by a lid 31 which has centrally thereof an outlet 32, the second container 30 is of hollow inverted truncated-conical shape, the internal face
 35 of the wall of which is polished. The bottom of the container 30 is open and watertight collecting bag

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52 is secured over the open bottom of the container 30 and held in position by an elastic band 54. A device 53 to hold the bag 52 open even in windy conditions is shown in Fig. 3. A tubular portion 9A' having the web 14' thereacross is provided for threaded engagement with said first container 10 and to hold said lid 31 to said first container 10. The portion 9A' has a lip 8'. A collar 22' is located in the recess 16'. Means 12' is provided as in the first embodiment. A liquid insecticide can be filled into the bag 52. As distinct from the first embodiment, the apparatus of the second embodiment can only be suspended from a tree or other support and an airborne trail of pheromone issues from the apparatus in the same way as in the first embodiment. In this embodiment, the insects attracted by the pheromone crawl inside the container 30 and normally can't escape and fall into or land in the bag 52.

Of the pheromone source is to be obtained from a live insect, the top of the first container 10 is covered with a gauze 36, and the container 10 is of clear or opaque material.

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CLAIMS

1. An apparatus for dispersing a gaseous or vapourised pheromone into the atmosphere, comprising a container in which are provided means to hold at least one source from which gaseous or vapourised pheromone is released, the container having at its top an outlet over which means to create an upward draught is mounted, the means being provided through which air can be drawn into the container.
2. An apparatus as claimed in Claim 1, wherein the means to create an upward draught comprises a series of annular vanes arranged in a pre-determined spaced relationship the uppermost and lowermost of which are parallel and of frusto-conical shape or substantially of frusto-conical shape, central apertures in said vanes, a common axis about which the vanes are centred and arranged in predetermined vertical spaced relationship, a plurality of supports parallel to and radial of said axis, the lower two of said vanes converging towards their centres to form a venturi at their inner peripheries, a device of aerodynamic shape mounted co-axially with the vanes and located between the upper two vanes, the device being circular in plan and masking the central apertures in the vanes, and having upper and lower cone-like or dish-shaped air-deflecting walls arranged base to base about said common axis, the upper wall of the device being parallel or substantially parallel to the uppermost and lowermost vanes.
3. An apparatus as claimed in Claim 1 or 2, wherein the container is an upright tube, the opening of the lower periphery of which is closable by a web provided in a second container the means in the container through which air can be drawn being one or more air bleed holes provided in said web which closes off the opening at the lower periphery of the first container.
4. An apparatus as claimed in Claim 3, wherein



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each pheromone source holding means is provided on the top of the web to extend into the first container.

5. An apparatus as claimed in Claims 3 or 4, wherein a skirt extends peripherally around the container below the means and on top of which skirt a sticky insecticide is located to entrap and kill insects.
6. An apparatus as claimed in Claim 3, 4 or 5, wherein the second container has an minor upper tubular portion integral with a major lower hollow frusto-conical portion in the bottom of the wall of which one or more cut-outs are provided.
7. An apparatus as claimed in Claim 3, 4 or 5, wherein the second container is open-topped closable by a lid centrally of which is provided the outlet over which the first container and means to create an upward draught is mounted, a tubular portion having the web thereacross being provided for engagement with said first container and to hold said lid to said first container.
8. An apparatus as claimed in Claim 7, wherein the second container is of inverted truncated conical shape over the lower periphery of which a collecting bag is securable.



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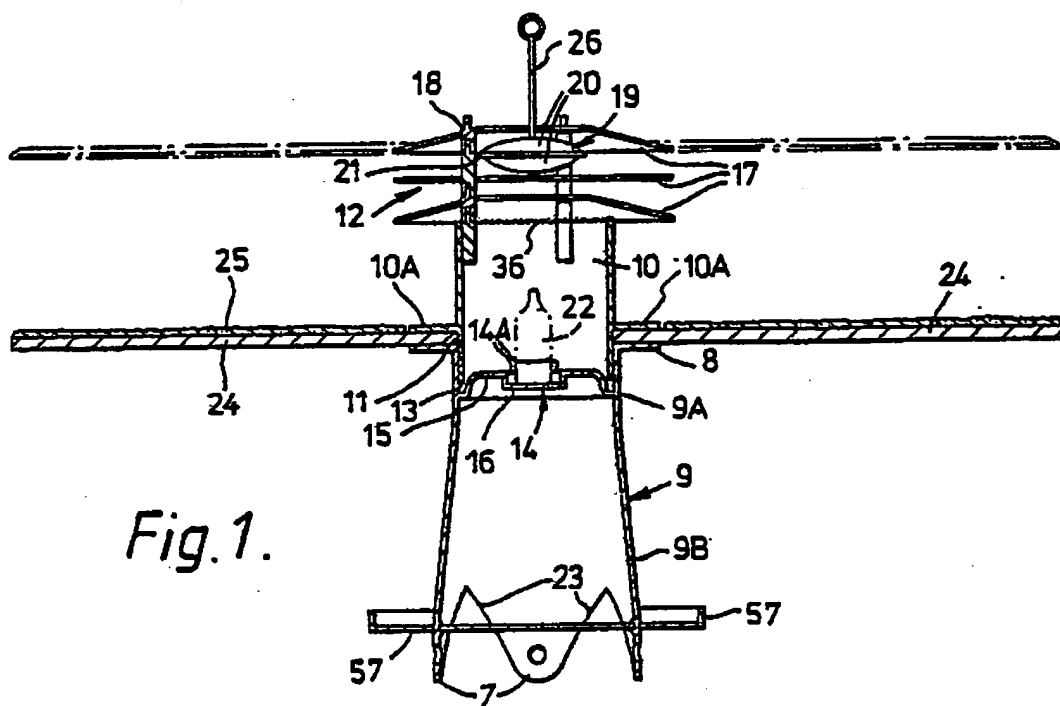


Fig. 1.

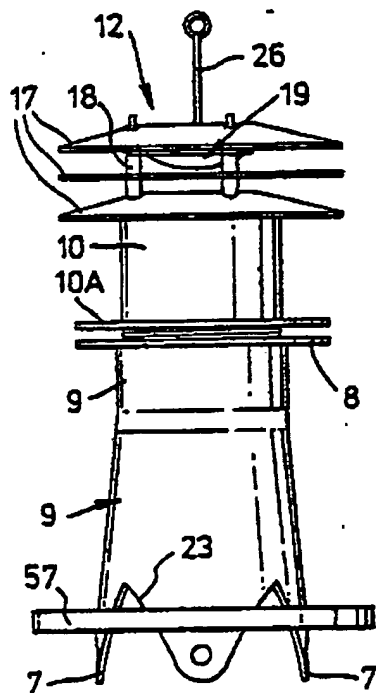


Fig. 2.

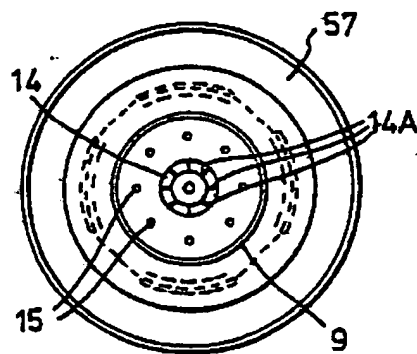
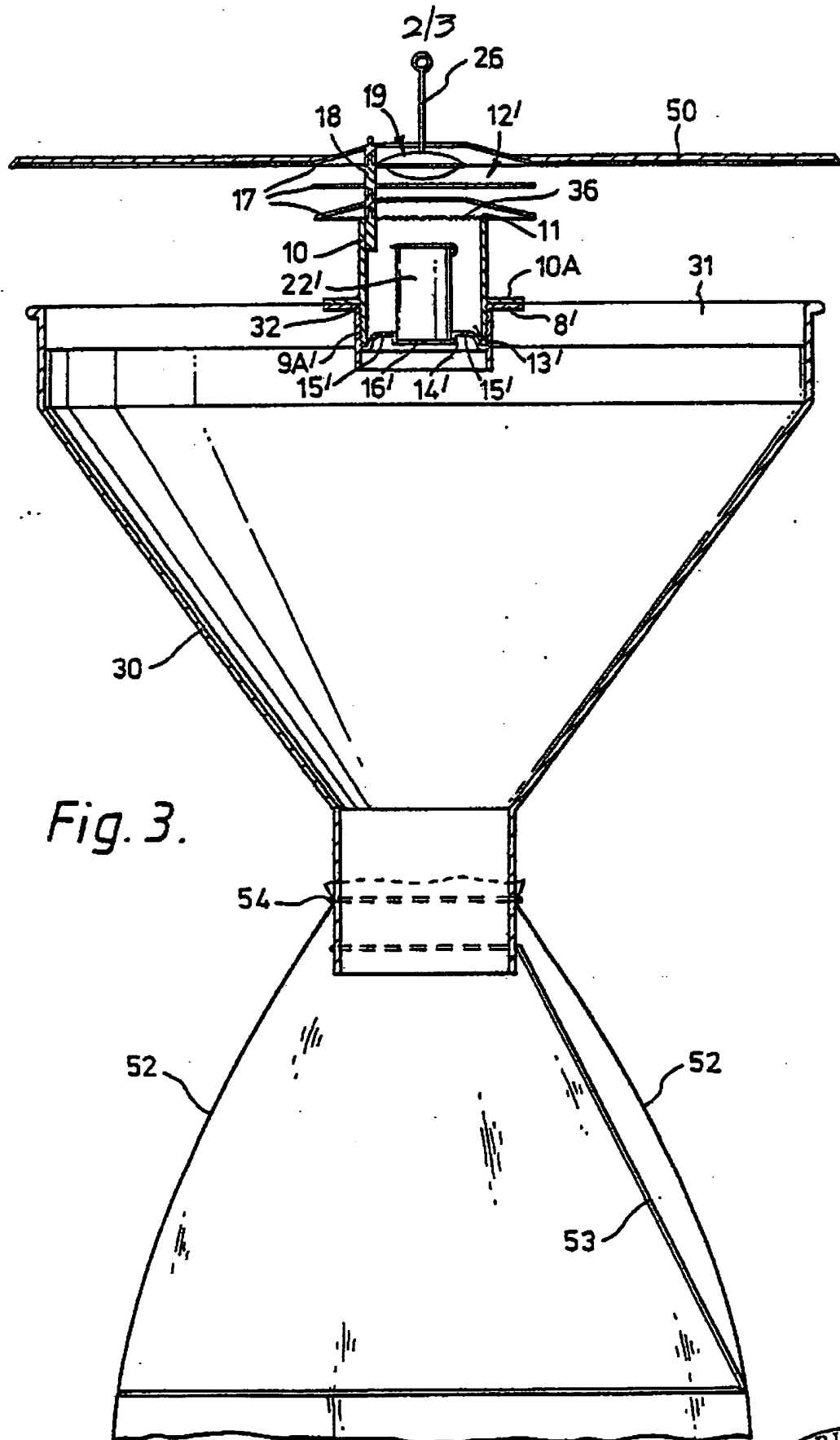


Fig. 4.



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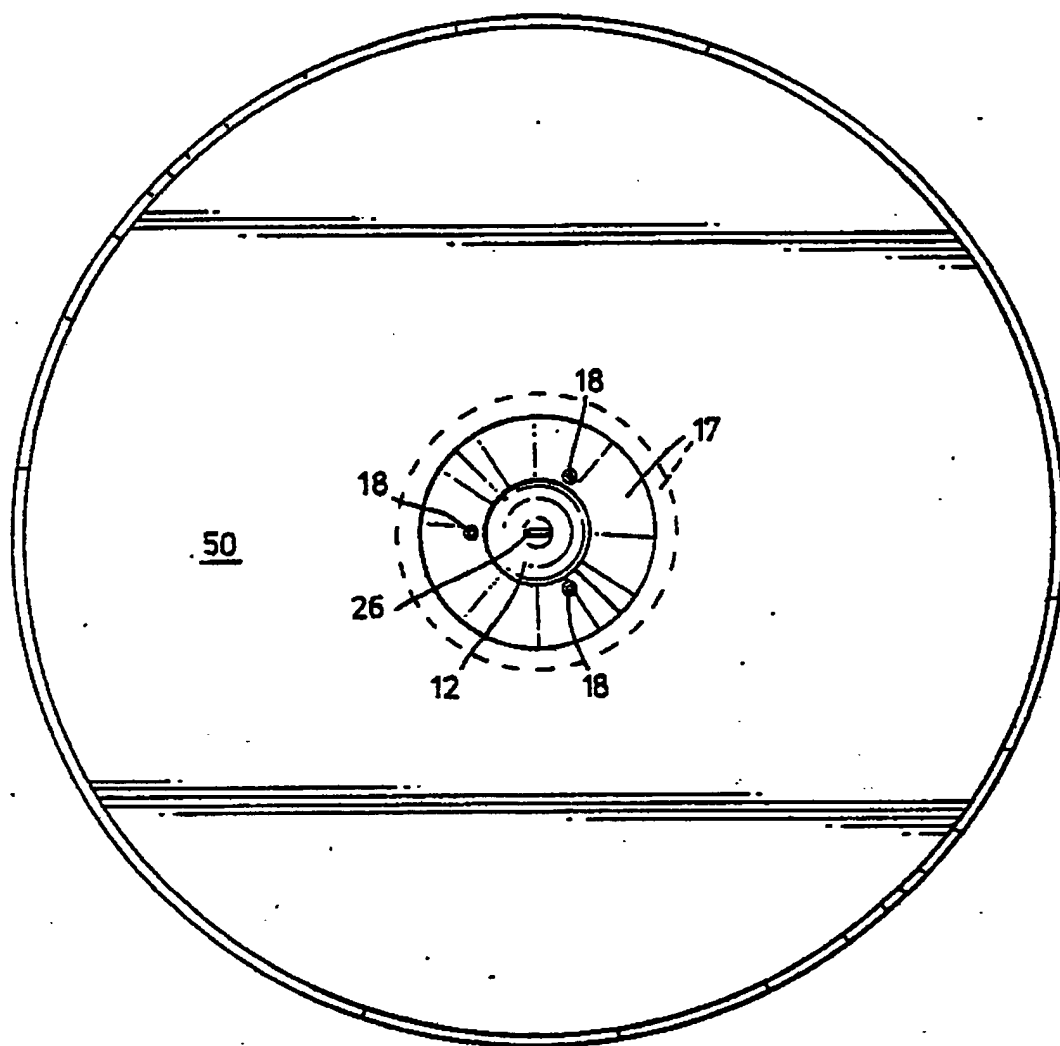


Fig. 5.

INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 81/00133

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) ¹ According to International Patent Classification (IPC) or to both National Classification and IPC <div style="text-align: center; font-family: monospace;"> Int.Cl.³ A 01 M 1/02; A 01 M 1/14; A 01 M 5/06; A 01 M 13/00; A 61 L 9/04 </div>																							
II. FIELDS SEARCHED <div style="text-align: center; font-size: small;">Minimum Documentation Searched ⁴</div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; padding: 5px;">Classification System ¹</td> <td style="padding: 5px;">Classification Symbols</td> </tr> <tr> <td style="padding: 5px;">Int.Cl.³</td> <td style="padding: 5px;">A 01 M; A 61 L</td> </tr> </table> <div style="text-align: center; font-size: x-small; margin-top: 5px;">Documentation Searched other than Minimum Documentation to the extent that such Documents are included in the Fields Searched ⁵</div>			Classification System ¹	Classification Symbols	Int.Cl. ³	A 01 M; A 61 L																	
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III. DOCUMENTS CONSIDERED TO BE RELEVANT ¹⁴ <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%; padding: 5px;">Category ⁶</th> <th style="width: 70%; padding: 5px;">Citation of Document, ¹⁸ with indication, where appropriate, of the relevant passages ¹⁷</th> <th style="width: 20%; padding: 5px;">Relevant to Claim No. ¹⁵</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">X</td> <td style="padding: 5px;">DE, A, 2412723, published 25th September 1975, see page 5, paragraph 5 - page 3, paragraph 2; page 5, paragraph 2; figure A.W. Steffan</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">US, A, 3848803, published 19th November 1974, J.S. Levey</td> <td></td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">CH, A, 585505, published 15th March 1977, Eidgenössische Forschungsanstalt für Obst-, Wein- und Gartenbau</td> <td></td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">DE, A, 2461724, published 23rd September 1976, Globol-Werk GmbH</td> <td></td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">DE, C, 898235, published 26th March 1953, O. Wernicke</td> <td></td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">P</td> <td style="padding: 5px;">GB, A, 2052942, published 4th February 1981, see page 1, lines 10-13, lines 41-42; page 1, line 59 - page 2, line 20; figures 1-4, Unilever Limited</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1-4, 6-8</td> </tr> </tbody> </table>			Category ⁶	Citation of Document, ¹⁸ with indication, where appropriate, of the relevant passages ¹⁷	Relevant to Claim No. ¹⁵	X	DE, A, 2412723, published 25th September 1975, see page 5, paragraph 5 - page 3, paragraph 2; page 5, paragraph 2; figure A.W. Steffan	1	A	US, A, 3848803, published 19th November 1974, J.S. Levey		A	CH, A, 585505, published 15th March 1977, Eidgenössische Forschungsanstalt für Obst-, Wein- und Gartenbau		A	DE, A, 2461724, published 23rd September 1976, Globol-Werk GmbH		A	DE, C, 898235, published 26th March 1953, O. Wernicke		P	GB, A, 2052942, published 4th February 1981, see page 1, lines 10-13, lines 41-42; page 1, line 59 - page 2, line 20; figures 1-4, Unilever Limited	1-4, 6-8
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<div style="font-size: x-small;"> ¹⁶ Special categories of cited documents: ¹³ "A" document defining the general state of the art "E" earlier document but published on or after the international filing date "L" document cited for special reason other than those referred to in the other categories "O" document referring to an oral disclosure, use, exhibition or other means "T" document published prior to the international filing date but on or after the priority date claimed "I" later document published on or after the international filing date or priority date and not in conflict with the application, but cited to understand the principle or theory underlying the invention "X" document of particular relevance </div>																							
IV. CERTIFICATION <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;"> Date of the Actual Completion of the International Search ⁸ <div style="text-align: center; font-family: monospace;">7th August 1981</div> </td> <td style="width: 50%; padding: 5px;"> Date of Mailing of this International Search Report ⁹ <div style="text-align: center; font-family: monospace;">21st August 1981</div> </td> </tr> <tr> <td style="padding: 5px;"> International Searching Authority: EUROPEAN PATENT OFFICE Branch at The Hague P.O.Box 5818 Patentlaan, 2 2280 HV RIJSWIJK (ZH) The Netherlands </td> <td style="padding: 5px;"> Signature of Authorized Officer ¹⁰ <div style="text-align: center;"> G.L.M. Kruidenberg </div> </td> </tr> </table>			Date of the Actual Completion of the International Search ⁸ <div style="text-align: center; font-family: monospace;">7th August 1981</div>	Date of Mailing of this International Search Report ⁹ <div style="text-align: center; font-family: monospace;">21st August 1981</div>	International Searching Authority: EUROPEAN PATENT OFFICE Branch at The Hague P.O.Box 5818 Patentlaan, 2 2280 HV RIJSWIJK (ZH) The Netherlands	Signature of Authorized Officer ¹⁰ <div style="text-align: center;"> G.L.M. Kruidenberg </div>																	
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